

**INCH-POUND**

MIL-C-110150  
AMENDMENT 9  
~~25 FEBRUARY 1994~~  
SUPERSEDING  
AMENDMENT 8  
14 June 1984

**MILITARY SPECIFICATION**

**CAPACITORS, FIXED, CERAMIC DIELECTRIC (GENERAL PURPOSE),**

**GENERAL SPECIFICATION FOR**

This amendment forms a part of MIL-C-110150, dated 6 December 1967,  
and is approved for use by all Departments and Agencies of  
the Department of Defense.

**PAGE 2**

2.1, SPECIFICATIONS, MILITARY, add:

"MIL-C-39014 - Capacitors, Fixed, Ceramic Dielectric (General Purpose), Established Reliability,  
General Specification For."

2.1, SPECIFICATIONS, MILITARY, delete:

"MIL-C-45662 - Calibration of Standards."

\* 2.1, STANDARDS, MILITARY, delete:

"MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes."

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2.1, STANDARDS, MILITARY, delete "MIL-STD-456" (and accompanying title) and substitute the following:

"MIL-STD-1285 - Marking of Electrical and Electronic Parts.

MIL-STD-45662 - Calibration Systems Requirements."

**PAGE 4**

3.11, title, delete "medium impact" and substitute "specified ruler".

3.13, title, delete "Temperature cycling" and substitute "Thermal shock".

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3.18, title, line 2, delete: "(qualification test)".

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3.21.2, line 1, delete "MIL-STD-456" and substitute "MIL-STD-1285".

After 3.21.2, add the following new paragraph:

"3.21.3 Marking of established reliability (ER) parts. An ER part manufactured in accordance with  
MIL-C-39014 may be marked and furnished as the non-ER part to this specification, if produced on the  
same assembly line or lines, and provided it is subjected to and meets all the inspection requirements  
of the ER part."

AMSC N/A

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After 3.22.1, add the following new paragraph:

"3.23 Marking legibility (laser marking only). When tested as specified in 4.6.18, the marking shall remain legible."

4.1.1, line 2, delete "MIL-C-45662" and substitute "MIL-STD-45662".

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TABLE IV, column 4: Delete "~~5/~~ 51 or ~~5/~~ 63" and substitute "(51 or 63) 4/".

TABLE IV, Examination or test column, Group II, delete "Shock, medium impact" and substitute "Shock, specified pulse".

TABLE IV, Examination or test column, Group II, delete "Temperature cycling" and substitute "Thermal shock".

TABLE IV, Group IV, delete and substitute:

GROUP IV						
Solderability - - - - -	3.17	4.6.14	10	1	"	
Marking legibility (laser marking only) - - - - -	3.23	4.6.18				

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4.5.1.1, delete and substitute:

"4.5.1.1 Inspection lot. An inspection lot shall consist of all capacitors in one or more styles, produced under essentially the same conditions, and offered for inspection at the same time. The samples from the lot shall be representative of the styles in the lot. The capacitance values and voltages produced shall also be represented in the lot in approximately the same ratio of production. Styles may be grouped as follows:

GROUP	Style
1 - - - - -	CK21, CK22, CK26, CK27, CK60, CK61, CK62, CK63, CK64, CK65, CK66, CK67, CK68, CK69, and CK72.
2 - - - - -	CK31 and CK32.
3 - - - - -	CK11, CK12, CK13, CK14, CK15, CK18, and CK19.
4 - - - - -	CK50, CK51, CK52, CK53, CK54, and CK55.
5 - - - - -	CK05 and CK06."

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\* TABLE V, delete in its entirety and substitute:

"TABLE V. Group A inspection.

Examination or test	Requirement paragraph	Test paragraph	Sampling procedure
Visual and mechanical examination		4.6.1	<div style="display: flex; align-items: center;"> <div style="width: 20px; border-left: 1px solid black; margin-right: 5px;"></div> <div>13 samples 0 failures</div> </div>
Materials	3.3		
Body dimensions	3.1		
Design construction (other than body dimensions)	3.4		
Marking 1/ Workmanship	3.21 3.22		
Dielectric withstanding voltage	3.5	4.6.2	<div style="display: flex; align-items: center;"> <div style="width: 20px; border-left: 1px solid black; margin-right: 5px;"></div> <div>13 samples 0 failures</div> </div>
Insulation resistance	3.7	4.6.4	
Capacitance	3.8	4.6.5	
Dissipation factor	3.9	4.6.6	
Seal (style CX18 and CX19)	3.10	4.6.7	

1/ Marking defects shall be based on visual examination only. Any subsequent electrical defects shall not be used as a basis for determining marking defects."

\* 4.5.1.2.1, delete in its entirety and substitute:

"4.5.1.2.1 Sampling plan. The sampling plan shall be as specified in table V."

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\* TABLE VI, delete in its entirety and substitute:

"TABLE VI. Group B inspection.

Examination or test	Requirement paragraph	Test paragraph	Sampling procedure
Voltage-temperature limits	3.19	4.6.16.2	<div style="display: flex; align-items: center;"> <div style="width: 20px; border-left: 1px solid black; margin-right: 5px;"></div> <div>5 samples 0 failures</div> </div>
Life (at elevated ambient temperature) (performance check)	3.20	4.6.17.2.1	

\* 4.5.1.3.1, delete in its entirety and substitute:

"4.5.1.3.1 Sampling plan. The sampling plan shall be as specified in table VI."

4.5.1.4.1.1 and 4.5.1.4.1.2, delete and substitute:

"4.5.1.4.1.1 Every 4 months (Subgroups 1 through 3). Every 4 months sample units shall be selected and subjected to the tests of subgroups 1 through 3 of table VII. Subgroups 1 and 2 may be checked during alternate 4-week periods (alternate 6-week periods for styles CX60 through CX69)."

"4.5.1.4.1.2 Every 4 months (Subgroup 4). Every 4 months (every 6 months for styles CX60 through CX69), sample units shall be selected and subjected to the test of subgroup 4 of table VII. These sample units shall be selected from sample units which have been subjected to the 250-hour performance test (see table VI)."

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TABLE VII, Test column, Subgroup 1 heading, delete "Every month" and substitute "Every 4 months".

TABLE VII, Test column, Subgroup 1, delete "Shock, medium impact" and substitute "Shock, specified pulse".

TABLE VII, Test column, Subgroup 1, delete "Temperature cycling" and substitute "Thermal shock".

TABLE VII, Test column, Subgroup 2 heading, delete "Every month" and substitute "Every 4 months".

TABLE VII, Subgroup 3, delete and substitute:

Every 4 months (Subgroup 3)					
Solderability - - - - -	3.17	4.6.14	] -10	] 1	
Marking legibility (laser marking only)- - - - -	3.23	4.6.18			
Resistance to soldering heat (all styles except CK21, CK22, CK26, and CK27)- - - - -	3.18	4.6.15	4	0	"

TABLE VII, Test column, Subgroup 4, delete "Every 2 months" and substitute "Every 4 months (every 6 months for styles CK60 through CK69)."

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4.6.2.2, delete and substitute:

"4.6.2.2 Body insulation (when applicable, see 3.1). Unless otherwise specified (see 3.1), capacitors shall be wrapped with conductive tape or foil not less than 0.065 inch and not more than 0.125 inch away from the lead wires. A dc potential (see 3.1) shall be applied between the two leads connected together and the conductive tape or foil for a period of 5 ±1 seconds. The circuit shall be so arranged that surge current will not exceed 50 mA. Following the test, capacitors shall be examined for evidence of damage and breakdown."

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4.6.8, title, line 1, delete "medium impact" and substitute "specified pulse".

4.6.8, line 2, delete "205" and substitute "213".

4.6.8 (b), delete and substitute:

"(b) Test condition letter - I (100 G's)."

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4.6.10, title, delete "Temperature cycling" and substitute "Thermal shock".

4.6.10.1, title, delete "Temperature cycling." and substitute "Thermal shock."

4.6.10.1, line 2, delete "102" and substitute "107".

4.6.10.1 (a), line 1, delete "Test condition letter - D" and substitute "Test condition letter - A".

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4.6.13 (d), line 3, delete "50 ±5 percent" and substitute "60 percent maximum".

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4.6.15, delete and substitute:

"4.6.15 Resistance to soldering heat (all styles except CX21, CX22, CX26, and CX27) (see 3.18). Capacitors shall be tested in accordance with method 210 of MIL-STD-202. The following details and exceptions shall apply:

- (a) Capacitors shall be preconditioned for a minimum period of 4 hours at 125°C, +4°C, -0°C with no voltage applied.
- (b) Depth of immersion in molten solder - To within 0.125 inch of the capacitor body.
- (c) Test condition letter - B (260°C ±5°C).
- (d) Cooling time prior to final examinations and measurements. Final measurements shall be made after a cooling time equal to the preconditioning time.
- (e) Measurements after test - Insulation resistance, capacitance, and dissipation factor shall be measured as specified in 4.6.4, 4.6.5, and 4.6.6, respectively."

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After 4.6.17.2.2, add the following new paragraph:

"4.6.18 Marking legibility (laser marking only). Capacitors shall be coated with 0.005 inch minimum of silicone resin insulating compound, type SR of MIL-I-46058. After curing, coated capacitors shall be examined for legibility under normal production room lighting by an inspector with normal or corrected 20/20 vision."

After 6.4, add the following new paragraph:

"6.4.1 Test data for identical ER parts. For the purpose of retention of qualification (see 4.5.2) and quality conformance inspection (see 4.5), test data on identical items covered by MIL-C-39014 may be used."

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After 20.1.3, add the following new paragraph:

"20.1.4 Group submission. A sample consisting of the number of sample units with type designations as shown in table XII shall be submitted. Failure of one style in a group will fail the complete group."

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After 30.3, add the following new paragraph and table:

"30.4 Group submission. Qualification of type designation(s) within the group will be the basis for qualifying the style(s) as shown in table XII."

TABLE XII. Group submission.

Group	Type designation	Number of sample units to be submitted	Rated temperature and voltage-temperature limits	Rated voltage	Will qualify style(s)
I	CK05BX102K	63	BX	200	CK05
	CK05BX103K	26	BX	100	
	CK05BX104K	26	BX	50	
II	CK06BX103K	63	BX	200	CK06
	CK06BX104K	26	BX	100	
	CK06BX105K	26	BX	50	
III	CK12BX223K	51	BX	50	CK12, 13, 14, 15, and 16
	CK15BX104K	51	BX	100	
	CK16BX105K	51	BX	100	
	CK16BX333K	51	BX	50	
IV	CK18BX222K	26	BX	100	CK18 and 19
	CK19BX223K	26	BX	100	
V	CK21AX681K	26	AX	500	CK21, 22, 26 and 27
	CK26AX152K	26	AX	500	
	CK22AX681K	26	AX	500	
	CK27AX152K	26	AX	500	
VI	CK31BT103K	26	BT	50	CK31 and 32
	CK32BT203K	26	BT	50	
	CK31BU203K	26	BU	50	
	CK32BU393K	26	BU	50	
	CK31BV513K	26	BV	50	
	CK32BY104K	26	BY	50	
VII	CK41BX102K	26	BX	100	CK41, 42 and 43
	CK43BX272K	26	BX	100	
VIII	CK50BX331K	26	BX	200	CK50, 51, 52, 53, 54, and 55
	CK53BX224K	26	BX	200	
	CK55BX105K	26	BX	100	
	CK55BX225K	26	BX	50	

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TABLE XII. Group submission - Continued.

Group	Type designation	Number of sample units to be submitted	Rated temperature and voltage-temperature limits	Rated voltage	Will qualify style(s)
IX	CK63BX332K	26	BX	500	CK60, 61, 62, and 63
	CK60BX101K	26	BX	1,000	
	CK63AM103M	26	AM	500	
	CK63AM472M	26	AM	1,000	
	CK63AY103M	26	AY	1,000	
	CK62AY471M	26	AY	1,500	
	CK60AX221M	26	AX	1,000	
	CK63CZ332K	26	CZ	500	
X	CK69AM153M	51	AM	1,600	CK64, 65, 66, 67, 68, and 69
	CK67AM752M	51	AM	1,600	
XI	CK70AX681K	26	AX	500	CK70
	CK70AX101K	26	AX	1,000	
XII	CK72AX102M	51	AX	1,500	CK72
XIII	CK80AX681K	26	AX	500	CK80
	CK80AM152M	26	AM	500	
XIV	CK81AX681K	26	AX	500	CK81
	CK81AM102M	26	AM	500	
XV	CK99BW122M	26	BW	200	CK99
	CK99BW502M	26	BW	50	

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

CONCLUDING MATERIAL

Custodians:  
Army - ER  
Navy - EC  
Air Force - 85

Preparing activity:  
DLA - ES  
(Project 5910-1886)

Review activities:  
Army - AR, NI  
Navy - AS, MC, OS, SH,  
Air Force - 17, 19, 99